IN THE UNITED STATES PATENT & TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant(s):	Curtis A. Richardson et al.	)	Examiner: A. Martin
Serial No.:	10/606,850	)	Art Unit: 1795
Filed:	June 26, 2003	)	Confirmation No. 5766
For:	PRESSURE CONTROL SYSTEM FOR FUEL CELL GAS SPRING	)	

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief – Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the final rejection of the Examiner mailed March 30, 2009 rejecting claims 11-31.

The Commissioner is hereby authorized to charge the fee of $540.00 required under 37 C.F.R. § 41.20(b)(2), and any other fee which may be due, or credit any overpayment, to Deposit Account No. 50-4635. If necessary, please consider this submission as a petition for an extension of time and charge any necessary fees that may be due to the Deposit Account listed above.

TABLE OF CONTENTS

	Page
Real Party in Interest	4
Related Appeals and Interferences	4
Status of Claims	4
Status of Amendments	4
Summary of Claimed Subject Matter	5
Ground of Rejection to be Reviewed on Appeal	9
Argument	9
Claims Appendix	21
Evidence Appendix	26
Related Proceedings Appendix	27

TABLE OF AUTHORITIES

Page(s)

Cases

Continental Can Co. USA v. Monsanto Co.,
948 F.2d 1264, 1268 (Fed. Cir. 1991)..... 11

In re Oelrich,
666 F.2d 578, 581 (CCPA 1981)..... 11

See Ex parte Humphreys,
24 USPQ2d 1255 (BPAI 1992)..... 16, 18

Statute

35 U.S.C. § 103(a)..... 9

Rules

37 C.F.R. § 41.20(b)(2)..... 1

37 C.F.R. § 41.37(c)(1)(v)..... 5

Other

MPEP 1205.02..... 5

I. REAL PARTY IN INTEREST

The subject application is owned by Delphi Technologies, Inc. of P.O. Box 5052, Troy, Michigan 48007-5052.

II. RELATED APPEALS AND INTERFERENCES

The Board rendered a decision dated June 18, 2008 in the above-referenced patent application, which related to a ground of rejection that is different than the ground of rejection presented in the present appeal. *See* Appendix A.

There are no known related interferences which would have any bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-10 have been cancelled.

Claims 11-31 have been rejected and are subject to this appeal.

IV. STATUS OF AMENDMENTS

In view of the Final Office Action mailed on March 30, 2009, Appellants submitted a Response to Final Office Action that was filed on June 1, 2009. No amendments were made at that time.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present appeal relates to pending independent claims 11, 13, 21 and 30, as well as dependent claims 15-18 and 24-27. Pursuant to 37 C.F.R. § 41.37(c)(1)(v), Appellants are required to provide a "concise explanation of the subject matter defined in each of the independent claims involved in the appeal, which shall refer to the specification by page and line number, and to the drawing, if any, by reference characters." Therefore, the concise explanation of the subject matter set forth below is mapped to independent claims 11, 13, 21 and 30, as well as claims 15-18 and 24-27. *See* 37 C.F.R. § 41.37(c)(1)(v); MPEP 1205.02.

As set forth in independent claims 11, 13, 21 and 30, the present invention is generally directed to a fuel cell assembly (70) comprising at least one fuel cell stack (72) and a supporting structure (76, 78) surrounding the fuel cell stack (72). *See Specification*, pg. 4, lines 7-8; pg. 6, lines 27-28; pg. 7, lines 1-5; FIG. 3.

Independent claim 11 further includes a gas spring (10) disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-15; pg. 6, lines 27-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a first membrane (20), a second membrane (22), and means for sealing edges of the first and second membranes (20, 22) to define a closed chamber (26) therebetween for capture of gas (28). *See id.* at pg. 5, lines 17-20, 24; FIGS. 2-3. A first valve means (30) is included for admitting gas to the chamber, and a second valve means (50) is included for

exhausting gas from the chamber. *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-19; FIGS. 2-3.

As set forth above, claim 11 includes means for sealing edges of the first and second membranes (20, 22) to define a closed chamber (26) therebetween for capture of gas (28). The structure that performs the stated function of sealing edges of the first and second membranes to define a closed chamber therebetween for capture of gas is the frame element (12) disclosed on page 5, lines 15-20 of the Specification and shown in FIGS. 2-3. *See* 37 C.F.R. § 41.37(c)(1)(v).

Independent claim 11 also includes a first valve means and a second valve means. Appellants submit that the first and second valve means both recite the necessary structure (i.e., a valve) to perform the claimed function of admitting gas to the chamber and exhausting gas from the chamber, respectively, and therefore are not in means-plus function format. If it is determined that the first valve means and the second valve means are in mean-plus function format, then the structure that corresponds to the first valve means is the first check valve (30), and the structure that corresponds to the second valve means is the second check valve (50). *See Specification*, pg. 5, line 28; pg. 6, lines 10-11; FIGS. 2-3.

Claim 15 depends from claim 11 and states that the means for sealing includes a rigid frame element (12) disposed between the first and second membranes (20, 22). *See id.* at pg. 5, lines 14-20; FIG. 2.

Claim 16 depends from claim 15 and states that the frame element (12) has a trough-shaped cross section. *See id.* at pg. 5, lines 15-17.

Claim 17 depends from claim 16 and states that the trough shape is radially concave. *See id.* at pg. 5, lines 15-17; FIG. 2.

Claim 18 depends from claim 16 and states that the trough shape is radially convex. *See id.* at pg. 5, lines 15-17.

Independent claim 13 further includes gas spring means (10) disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The gas spring means (10) defines a closed chamber (26) and includes an inlet valve (30) for admitting gas (28) into the chamber (26) and an outlet valve (50) for exhausting gas (28) from the chamber (26). *See id.* at pg. 5, lines 20, 24, 28-31; pg. 6, lines 1-19; FIGS. 2-3. While claim 13 uses the term "means" in the "gas spring means" limitation, Appellants submit that this is not a means-plus function claim limitation. The structure that performs the function of admitting gas into the chamber and exhausting gas from the chamber is the inlet and outlet valves, and both valves are recited in claim 13.

Independent claim 21 further includes a gas spring (10) disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a membrane defining a gas chamber (26). *See id.* at pg. 5, lines 18-20. A first valve (30) is positioned in the membrane for admitting gas (28) to the chamber (26) and a second valve (50) is positioned in

the membrane for exhausting gas (28) from the chamber (26). *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-23.

Claim 24 depends indirectly from claim 21 and states that a seal for sealing the edges of the first and second membranes (20, 22) includes a rigid frame element (12) disposed between the first and second membranes (20, 22). *See id.* at pg. 5, lines 14-20; FIG. 2.

Claim 25 depends from claim 24 and states that the frame element (12) has a trough-shaped cross section. *See id.* at pg. 5, lines 15-17.

Claim 26 depends from claim 25 and states that the trough shape is radially concave. *See id.* at pg. 5, lines 15-17; FIG. 2.

Claim 27 depends from claim 25 and states that the trough shape is radially convex. *See id.* at pg. 5, lines 15-17.

Independent claim 30 further includes a gas spring (10) disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a membrane defining a gas chamber (26), wherein the gas within the closed chamber is at a first pressure. *See id.* at pg. 5, lines 18-20. A first valve is positioned in the membrane for admitting gas to the chamber from an exterior of the gas spring, and a second valve is positioned in the membrane for exhausting gas from the chamber into the exterior, wherein the exterior is at a second pressure. *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-23.

VI. GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Claims 11-31 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication No. 2003/0203267 to Chou et al. ("the Chou reference") in view of U.S. Patent No. 6,626,650 to Kenchington et al. ("the Kenchington reference").

VII. ARGUMENT

Issue – Whether claims 11-31 are unpatentable under 35 U.S.C. § 103(a) as being obvious over the Chou reference in view of the Kenchington reference.

Independent claim 11 is directed to a fuel cell assembly (70) comprising at least one fuel cell stack (72) and a supporting structure (76, 78) surrounding the fuel cell stack (72). *See Specification*, pg. 4, lines 7-8; pg. 6, lines 27-28; pg. 7, lines 1-5; FIG. 3. A gas spring (10) is disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-15; pg. 6, lines 27-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a first membrane (20), a second membrane (22), and means for sealing edges of the first and second membranes (20, 22) to define a closed chamber (26) therebetween for capture of gas (28). *See id.* at pg. 5, lines 17-20, 24; FIGS. 2-3. A first valve means (30) is included for admitting gas to the chamber, and a second valve means (50) is included for exhausting gas from the chamber. *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-19; FIGS. 2-3.

Appellants submit that the proposed combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly

including a gas spring as recited in claim 11. In the Office Action mailed March 30, 2009 ("Office Action"), the Examiner stated that the Chou reference teaches the gas spring recited in claim 11. *See Office Action*, pgs. 2-3. Specifically, the Examiner pointed to paragraph [0067] of the Chou reference to support the assertion that a gas spring is disclosed therein. *See id.* Appellants respectfully disagree with the Examiner's position that a gas spring is disclosed in the Chou reference.

Paragraph [0067] of the Chou reference states that FIG. 5 discloses a compression member (301) configured to exert a compressive force to the components (340, 350, 360, 370, 380, 390) and the seals (345, 355, 365, 375, 385, 395) of an electrochemical device (300). As best seen in FIG. 5 of the Chou reference, the compression member (301) includes a tie rod having two hex nuts attached to the ends of the tie rod on opposite ends of the electrochemical device (300). Appellants submit that the combination of the tie rod and hex nuts shown in FIG. 5 is not a gas spring.

Paragraph [0067] of the Chou reference states that FIG. 6 discloses a compression member (301) including two end plates (302, 303) that operate in conjunction with one or more tie rods and hex nuts to compress and maintain the electrochemical device (300) in an assembled state between end plates (302, 303). The combination of the end plates (302, 303) disposed on opposing sides of the electrochemical device (300), the tie rods, and the hex nuts do not amount to a gas spring as defined in claim 11.

In the Office Action, the Examiner made reference to a specific portion of paragraph [0067] of the Chou reference in support of the position that a gas spring is disclosed in the Chou reference. *See Office Action*, pg. 3. In particular, it was noted by the Examiner that the Chou reference states that the compression member (301) includes "springs, hydraulic or pneumatic pistons, pressure pads or other resilient compressive means . . . ." *Chou*, ¶ [0067]; *see Office Action*, pg. 3. Even though the Examiner acknowledged that this passage does not specifically recite what type of spring is being referred to in the Chou reference, the Examiner concluded that this general disclosure of a "spring" may be used to anticipate the gas spring set forth in claim 11. *See id.*

Appellants submit that there is no basis for concluding that the "spring" disclosed in paragraph [0067] of the Chou reference is a gas spring as defined in claim 11. Since the Examiner has acknowledged that the Chou reference does not explicitly disclose that the "spring" in the Chou reference is a gas spring, Appellants assume that the Examiner is relying on an inherency theory.

It is the Examiner's burden to "make it clear that the missing descriptive matter is necessarily present in the thing described in the prior art reference, and that it would be so recognized by persons of ordinary skill." *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). "Inherency, however, may not be established by probabilities or possibilities." *Id.* at 1269 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)). "The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *Id.*

There is nothing in the Chou reference to indicate that the springs mentioned therein are gas springs as particularly claimed by Appellants. The general reference to a "spring" in the Chou reference likely refers to a spring that could readily be adapted to and used in conjunction with the centrally located rod and nut shown in FIGS. 5 and 6. For instance, the spring referred to in the Chou reference could be a reference to a mechanical spring of some type, such as a mechanical compression spring, metallic coil or leaf spring. The Office Action also makes passing reference to column 3, lines 7-9 of the Kenchington reference, which mentions a gas spring. *See Office Action*, pg. 3. However, the gas spring mentioned in the Kenchington reference relates to a discussion of the background art, which relates to the use of a gas spring in a Stirling engine, not in relation to a fuel cell assembly. *See Kenchington*, Col. 3, lines 1-14.

It should also be noted that paragraph [0067] of the Chou reference incorporates by reference the compressive members that are disclosed in U.S. Patent Nos. 4,478,917 and 5,176,966. Both of the compressive members disclosed in the above-referenced patents include two rigid plates positioned on opposite sides of a fuel cell stack assembly, which are compressed using a plurality of tie rods and nuts, similar to the arrangement shown in FIG. 6 of the Chou reference. As is the case with the Chou reference, neither of the above-referenced patents disclose a gas spring as set forth in claim 11.

Since nothing in paragraph [0067] and FIGS. 5 and 6 of the Chou reference disclose a gas spring as set forth in claim 11, Appellants submit that

the proposed combination of the Chou reference and the Kenchington reference fail to teach or suggest all of the limitations included in claim 11.

Furthermore, Appellants submit that the proposed combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly including a gas spring including a first membrane, a second membrane, and means for sealing edges of the first and second membranes to define a closed chamber therebetween for the capture of gas as recited in claim 11. In rejecting this portion of claim 11, the Examiner maintains that the compression member (301) and FIGS. 5 and 6 teach the first and second membranes of the gas spring. *See Office Action*, pg. 2. In the Office Action, the Examiner was not specific as to which components of the compression member (301) are being designated as the first and second membranes of the gas spring in claim 11. In the Response to Final Office Action filed on June 1, 2009 ("Response"), Appellants requested that the Examiner clarify and provide Appellants with more detail in regard to which components in the Chou reference represent first and second membranes of the gas spring set forth in claim 11. *See Response*, pg. 11. The Advisory Action mailed on June 18, 2009 ("Advisory Action") failed to provide the additional detail related to the first and second membranes of the gas spring, which was requested by Appellants.

For purposes of this appeal, Appellants will assume that the Examiner is designating the end plates (302, 303), which are components of the compression member (301), as the first and second membranes of the gas spring disclosed in claim 11.

The Examiner cited paragraphs [0068]-[0075] of the Chou reference to support the assertion that the edges of the end plates (302, 303) are sealed to define a closed chamber for the capture of gas. *See Office Action*, pg. 2. Paragraphs [0068]-[0075] of the Chou reference state that each of the fuel cell components (340, 350, 360, 370, 380, 390) are sealed together using multi-layer seals (345, 355, 365, 375, 385, 395) to form at least one boundary between fuel and oxidant streams (i.e., fuel and oxidant flow chambers) and to define a junction between the fuel cell components. *See, e.g., Chou* at ¶ [0071]. Appellants therefore assume that the Examiner is taking the position that the closed chamber recited in claim 11 corresponds to the fuel and oxidant flow chambers positioned between the two end plates (302, 303) (i.e., first and second membranes) in the Chou reference. Thus, according to the Examiner, the two end plates (302, 303) in the Chou reference are the first and second membranes of the gas spring in claim 11, and the closed chamber defined by the end plates (302, 303) is one or more of the fuel and oxidant flow passages defined within the fuel cell stack itself. Based on this interpretation of the Chou reference, the gas spring defined in the Chou reference cannot be disposed between the fuel cell stack and a supporting structure (as recited in claim 11) since the fuel cell stack is positioned between the first and second membranes (i.e., end plates (302, 303)) that are used to form the closed chamber of the gas spring. As such, Appellants submit that the Chou reference does not teach or suggest a gas spring disposed between the fuel cell stack and the supporting structure as recited in claim 11.

Moreover, Appellants submit that the proposed combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly including a gas spring disposed between a fuel cell stack and a supporting structure, wherein the supporting structure surrounds the fuel cell stack as recited in claim 11. In the Office Action, the Examiner made reference to FIGS. 5 and 6 of the Chou reference, and stated that the fuel cell components (340, 350, 360) represent the fuel cell stack in claim 11, and the ceramic substrate within each fuel cell component correspond to the support structure set forth in claim 11. *See Office Action*, pgs. 2-3. In response to the position taken by the Examiner, Appellants believe it is important to point out that claim 11 specifically states that the support structure surrounds the fuel cell stack. Therefore, it is unclear to the Appellants how the ceramic substrate within each fuel cell component can be interpreted as the support structure in claim 11, when the ceramic substrate does not surround the fuel cell stack. In other words, Appellants do not see how the ceramic substrate within each fuel cell component shown in FIGS. 5 and 6 of the Chou reference surround the fuel cell stack (i.e., fuel cell components (340, 350, 360)). In view of the above, it is submitted that the Chou reference does not disclose a gas spring positioned between a fuel cell stack and a supporting structure that surrounds the fuel cell stack, as recited in claim 11.

For at least the reasons set forth above, Appellants submit that the combination of the Chou reference and the Kenchington reference does not teach or suggest all of the limitations included in claim 11. It is therefore

requested that the rejection of claim 11 be reversed. As claims 12 and 14-20 depend either directly or indirectly from claim 11, these claims are not taught or suggested by the proposed combination of references for at least the same reasons that were set forth above with respect to claim 11. It is requested that the rejection of claims 12 and 14-20 be reversed.

Dependent claims 15-18 include additional limitations that are not taught or suggested by the proposed combination of the Chou reference and the Kenchington reference. Claim 15 states that the means for sealing includes a rigid frame element (12) disposed between the first and second membranes (20, 22), claim 16 states that the frame element (12) has a trough-shaped cross section, and claims 17 and 18 state that the trough shape is radially concave or radially convex, respectively. *See Specification*, pg. 5, lines 14-20; FIG. 2

The Examiner has not provided any explanation as to how the Chou reference or the Kenchington reference render claims 15-18 obvious. *See Ex parte Humphreys*, 24 USPQ2d 1255 (BPAI 1992) (stating that a prima facie case of obviousness is not established if the examiner fails to provide specific reasons to support rejection). For at least this reason, Appellants request that the rejection of claims 15-18 be reversed.

Independent claim 13 is directed to a fuel cell assembly (70) comprising at least one fuel cell stack (72) and a supporting structure (76, 78) surrounding the fuel cell stack (72). *See Specification*, pg. 4, lines 7-8; pg. 6, lines 27-28; pg. 7, lines 1-5; FIG. 3. A gas spring means (10) is disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4,

lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The gas spring means (10) defines a closed chamber (26) and includes an inlet valve (30) for admitting gas (28) into the chamber (26) and an outlet valve (50) for exhausting gas (28) from the chamber (26). *See id.* at pg. 5, lines 20, 24, 28-31; pg. 6, lines 1-19; FIGS. 2-3.

For at least the same reasons that were set forth above with respect to claim 11, Appellants submit that the combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly including gas spring means disposed within the fuel cell assembly between a fuel cell stack and a supporting structure, wherein the supporting structure surrounds the fuel cell stack as recited in claim 13. It is therefore requested that the rejection of claim 13 be reversed.

Independent claim 21 is directed to a fuel cell assembly (70) comprising at least one fuel cell stack (72) and a supporting structure (76, 78) surrounding the fuel cell stack (72). *See Specification*, pg. 4, lines 7-8; pg. 6, lines 27-28; pg. 7, lines 1-5; FIG. 3. A gas spring (10) is disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a membrane defining a gas chamber (26). *See id.* at pg. 5, lines 18-20. A first valve (30) is positioned in the membrane for admitting gas (28) to the chamber (26) and a second valve (50) is positioned in the membrane for exhausting gas (28) from the chamber (26). *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-23.

For at least the same reasons that were set forth above with respect to claim 11, Appellants submit that the combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly including a gas spring disposed within the fuel cell assembly between a fuel cell stack and a supporting structure, wherein the supporting structure surrounds the fuel cell stack as recited in claim 21. It is therefore requested that the rejection of claim 21 be reversed. As claims 22-29 depend either directly or indirectly from claim 21, these claims are not taught or suggested by the proposed combination of references for at least the same reasons that were set forth with respect to claim 21. It is requested that the rejection of claims 22-29 be reversed.

Dependent claims 24-27 include additional limitations that are not taught or suggested by the Chou reference or the Kenchington reference. Claim 24 states that the a seal for sealing the edges of the first and second membranes (20, 22) includes a rigid frame element (12) disposed between the first and second membranes (20, 22), claim 25 states that the frame element (12) has a trough-shaped cross section, claims 26 and 27 state that the trough shape is radially concave or radially convex, respectively. *See Specification*, pg. 5, lines 14-20; FIG. 2.

The Examiner has not provided any explanation as to how the Chou reference or the Kenchington reference render claims 24-27 obvious. *See Humphreys*, 24 USPQ2d at 1255. For at least this reason, Appellants request that the rejection of claims 24-27 be reversed.

Independent claim 30 is directed to a fuel cell assembly (70) comprising at least one fuel cell stack (72) and a supporting structure (76, 78) surrounding the fuel cell stack (72). *See Specification*, pg. 4, lines 7-8; pg. 6, lines 27-28; pg. 7, lines 1-5; FIG. 3. A gas spring (10) is disposed within the assembly (70) between the stack (72) and the supporting structure (76, 78). *See id.* at pg. 4, lines 8-10; pg. 5, lines 14-20; pg. 6, lines 23-31; pg. 7, lines 1-5; FIG. 3. The spring (10) includes a membrane defining a gas chamber (26), wherein the gas within the closed chamber is at a first pressure. *See id.* at pg. 5, lines 18-20. A first valve is positioned in the membrane for admitting gas to the chamber from an exterior of the gas spring, and a second valve is positioned in the membrane for exhausting gas from the chamber into the exterior, wherein the exterior is at a second pressure. *See id.* at pg. 5, lines 28-31; pg. 6, lines 1-23.

For at least the same reasons that were set forth above with respect to claim 11, Appellants submit that the combination of the Chou reference and the Kenchington reference does not teach or suggest a fuel cell assembly including a gas spring disposed within the fuel cell assembly between a fuel cell stack and a supporting structure, wherein the supporting structure surrounds the fuel cell stack as recited in claim 30. It is therefore requested that the rejection of claim 30 be reversed. As claim 31 depends from claim 30, this claim is not taught or suggested by the proposed combination of references for at least the same reasons that were set forth with respect to claim 30. It is requested that the rejection of claim 31 be reversed.

Conclusion

For each ground of rejection which Appellants contest herein applies to more than one claim, such additional claims, to the extent separately identified and argued above, do not stand or fall together.

In view of the above, Appellants submit that the references of record fail to teach or suggest every limitation disclosed in claims 11-31, and request that the rejections of these claims be reversed.

Respectfully submitted,

Dated: 8/31/2009

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VIII. CLAIMS APPENDIX

The text of the claims involved in the appeal reads as follows:

Claims 1-10 (Cancelled).

11. (Original) A fuel cell assembly, comprising:

a) at least one fuel cell stack;

b) a supporting structure surrounding said fuel cell stack; and

c) a gas spring disposed within said assembly between said stack and said supporting structure, said spring including a first membrane, a second membrane, means for sealing edges of said first and second membranes to define a closed chamber therebetween for capture of gas, first valve means for admitting gas to said chamber, and second valve means for exhausting gas from said chamber.

12. (Original) A fuel cell assembly in accordance with Claim 11 wherein said fuel cell stack includes at least one solid-oxide fuel cell.

13. (Original) A fuel cell assembly comprising:

a) at least one fuel cell stack;

b) a supporting structure surrounding said fuel cell stack; and

c) gas spring means disposed within said assembly between said stack and said supporting structure, said gas spring means defining a closed chamber and including an inlet valve for admitting gas into said chamber and an outlet valve for exhausting gas from said chamber.

14. (Previously presented) A fuel cell assembly in accordance with Claim 11 wherein said means for sealing includes direct sealing of said first membrane to said second membrane to form a gas-filled pillow.

15. (Previously presented) A fuel cell assembly in accordance with Claim 11 wherein said means for sealing includes a rigid frame element disposed between said first and second membranes.

16. (Previously presented) A fuel cell assembly in accordance with Claim 15 wherein said frame element has a trough-shaped cross section.

17. (Previously presented) A fuel cell assembly in accordance with Claim 16 wherein said trough shape is radially concave.

18. (Previously presented) A fuel cell assembly in accordance with Claim 16 wherein said trough shape is radially convex.

19. (Previously presented) A fuel cell assembly in accordance with Claim 11 wherein said first valve means is a check valve.

20. (Previously presented) A fuel cell assembly in accordance with Claim 11 wherein said second valve means is a check valve.

21. (Previously presented) A fuel cell assembly, comprising:

a) at least one fuel cell stack;

b) a supporting structure surrounding said fuel cell stack;

c) a gas spring disposed within said assembly between said stack and said supporting structure, said spring including a membrane defining a gas chamber;

d) a first valve positioned in said membrane for admitting gas to said chamber; and

e) a second valve positioned in said membrane for exhausting gas from said chamber.

22. (Previously presented) A fuel cell assembly in accordance with Claim 21 wherein said membrane includes a first membrane and a second membrane.

23. (Previously presented) A fuel cell assembly in accordance with Claim 22 further comprising a seal for sealing edges of said first and second membranes.

24. (Previously presented) A fuel cell assembly in accordance with Claim 23 wherein said seal includes a rigid frame element disposed between said first and second membranes.

25. (Previously presented) A fuel cell assembly in accordance with Claim 24 wherein said frame element has a trough-shaped cross section.

26. (Previously presented) A fuel cell assembly in accordance with Claim 25 wherein said trough shape is radially concave.

27. (Previously presented) A fuel cell assembly in accordance with Claim 25 wherein said trough shape is radially convex.

28. (Previously presented) A fuel cell assembly in accordance with Claim 21 wherein said first valve is a check valve.

29. (Previously presented) A fuel cell assembly in accordance with Claim 21 wherein said second valve is a check valve.

30. (Previously presented) A fuel cell assembly, comprising:

a) at least one fuel cell stack;

b) a supporting structure surrounding said fuel cell stack;

c) a gas spring disposed within said assembly between said stack and said supporting structure, said spring including a membrane defining a gas chamber, wherein said gas within said closed chamber is at a first pressure;

d) a first valve positioned in said membrane for admitting gas to said chamber from an exterior of said gas spring; and

e) a second valve positioned in said membrane for exhausting gas from said chamber into said exterior, wherein said exterior is at a second pressure.

31. (Previously presented) A fuel cell assembly in accordance with Claim 30 wherein said second pressure is ambient air pressure.

IX. EVIDENCE APPENDIX

There has been no additional evidence submitted, entered by the Examiner, or relied upon by the Appellants in the present appeal.

X. RELATED PROCEEDINGS APPENDIX

A copy of the Board's decision dated June 18, 2008 in the above-referenced patent application is attached hereto as Appendix A.

UNITED STATES PATENT AND TRADEMARK OFFICE

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10/606,850	06/26/2003	Curtis A. Richardson	89190.022003/DP309241	5766

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EXAMINER	
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CURTIS A. RICHARDSON and
MICHAEL J. YAX

Appeal 2008-2796
Application 10/606850
Technology Center 1700

Decided: June 18, 2008

Before EDWARD C. KIMLIN, ROMULO H. DELMENDO and MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

COLAIANNI, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134 the final rejection of claims 11-29. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

We AFFIRM.

INTRODUCTION

Appellants claim a fuel cell assembly comprising, in relevant part, a gas spring 10 disposed within the assembly between the stack and supporting structure, said spring including a first membrane 20, a second

membrane 22, means for sealing edges of said first and second membranes to define a closed chamber therebetween for capture of gas 24, first valve means for admitting gas to said chamber 30, and second valve means for exhausting gas from said chamber (Claim 11, Figure 2). The gas spring is disclosed as providing a compressive load to a fuel cell assembly at ambient and elevated temperatures to compensate for mismatches in the heights of multiple stacks and for the difference in thermal expansion between the stacks and the supporting structure (Spec. 3).

Claim 11 is illustrative:

11. A fuel cell assembly, comprising:
a) at least one fuel cell stack;
b) a supporting structure surrounding said fuel cell stack; and
c) a gas spring disposed within said assembly between said stack and said supporting structure, said spring including a first membrane, a second membrane, means for sealing edges of said first and second membranes to define a closed chamber therebetween for capture of gas, first valve means for admitting gas to said chamber, and second valve means for exhausting gas from said chamber.

The Examiner relies on the following prior art references as evidence of unpatentability:

Kenchington	6,626,650 B1	Sep. 30, 2003 (Dec. 7, 2001)
Simpkins	2003/0235723 A1	Dec. 25, 2003 (Mar. 13, 2003)

The rejection as presented by the Examiner is as follows:

1. Claims 11-29 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Simpkins in view of Kenchington.

The Examiner finds that Simpkins discloses all of the features of claim 11, except for the first valve means and the second valve means (Ans.

3). The Examiner finds that Kenchington discloses the first and second valve means for fluid displacement, which may be used in a fuel cell system and a gas spring (Ans. 3).[1] The Examiner concludes that it would have been obvious at the time the invention was made to combine Kenchington's valves with Simpkins gas spring because "Kenchington . . . teach that the first and second valve means allow gas to be expelled only when a pressure differential is established, which would prevent a portion of gas from leaking in an opposite direction from the flow of gas" (Ans. 4).

Appellants argue independent claims 11, 13, and 21. However, Appellants' arguments regarding claims 13 and 21 do not amount to separate arguments because Appellants' make the same arguments with regard to claims 13 and 21 as are made regarding claim 11. Accordingly, we focus on claim 11 in addressing Appellants' arguments regarding the § 103 rejection.

OPINION

Appellants argue that Kenchington is non-analogous art (Br. 8). Specifically, Appellants contend that there is no evidence of record to suggest that Kenchington's valves (16, 116) could be used for a fuel cell assembly such as shown in Simpkins (i.e., the references are in different fields of endeavor) (Br. 8). Appellants contend that Kenchington's displacement machine would be used in lieu of a fuel cell assembly such that Kenchington teaches away from using the valves in a fuel cell assembly (Br. 9). Appellants contend that the problem addressed by Kenchington's valves

[1] Appellants indicate and the Examiner agrees that the "first valve means" and "second valve means" are not in means-plus-function format and thus do not invoke 35 U.S.C. § 112, 6th paragraph (Br. 5; Ans. 4).

is not reasonably pertinent to the problem Appellants are trying to solve (Br. 9). Appellants contend that the problem addressed by their claimed invention is maintaining a compressive load on a fuel cell assembly within a predetermined pressure range at ambient and elevated temperatures (Br. 9). In contrast, Appellants contend, Kenchington's valves are directed to the problem of maintaining a constant pressure within a given chamber upon a change in volume (Br. 10). Appellants contend that there is no motivation for the combination because of the different purpose of the valves (Br. 10).

Appellants further argue that there is no motivation for combining Kenchington's valves with Simpkins' gas spring because the Examiner refers to separate embodiments in Kenchington for the teaching of the valves (i.e., to valve 16 in Kenchington's first embodiment as the first valve means and valve 116 in Kenchington's compressor embodiment as the second valve means) and Kenchington does not disclose putting those valves from the separate embodiments together (Br. 11).

We have considered Appellants' arguments and are unpersuaded for the reasons below.

When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1740 (2007). "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *Id.* Any need or problem known in the field of endeavor at the time of invention and addressed by the prior art

can provide a reason for combining the elements in the manner claimed. *KSR*, 127 S. Ct. at 1742.

Simpkins discloses a gas spring in which the pressure increases with temperature according to Boyle's Law[2] (Simpkins, ¶ [0016]). Simpkins discloses that air is added to the gas spring in a known fashion at any desired temperature (Simpkins, ¶ [0033]).

Kenchington discloses a cyclically operable fluid displacement machine (Kenchington, col. 1, ll. 4 and 5). Kenchington discloses a compressor embodiment having a one-way valve 106 that permits gas to flow via inlet 107 into a chamber 104, but not out of the chamber 104 into the inlet 107 (Kenchington, col. 12, ll. 30-33). Kenchington further discloses that the one-way valve 106 permits air ingress when a preset pressure limit is reached (Kenchington, col. 12, ll. 33-37). Kenchington further discloses a third one-way valve 116 which allows gas to be expelled from a chamber 105 to an outlet 117 but does not allow gas to be drawn into the chamber 105 from the outlet 117 (Kenchington, col. 13, ll. 6-11). Kenchington further discloses that air is expelled through valve 116 only when a preset pressure differential is met or surpassed (Kenchington, col. 13, ll. 11-14).

We are unpersuaded by Appellants' mere argument that Kenchington and Simpkins are not in the same field of endeavor because this is not dispositive to the question of whether a person having ordinary skill in the art would have combined the elements in the manner claimed. Even if these references are from different fields of endeavor, Appellants have failed to

[2] Boyle's Law states that in a closed system approaching ideal gas environments, pressure (P) and volume (V) are inversely proportional at a fixed temperature.

demonstrate that Kenchington's valves would *not* reasonably be expected to improve the Simpkins device by facilitating Simpkins' purpose of adding air to the gas spring in a known fashion. *KSR*, 127 S. Ct. at 1740.

Based on the above disclosures, we determine that Kenchington's invention controls pressure in a chamber using check valves. We determine that Kenchington is analogous art because it addresses a problem relevant to Simpkins' disclosed invention, which need not be the same problem addressed by Appellants' claimed invention. *KSR*, 127 S. Ct at 1742. Specifically, Kenchington discloses using check valves for release or addition of air to a closed chamber in response to predetermined pressures. Accordingly, one of ordinary skill in the art presented with Simpkins' sealed gas spring susceptible to overpressurization would have looked to Kenchington's valves (i.e., check valves) to prevent the gas spring from being overpressurized due to temperature and/or volume changes by permitting the ingress or egress of gas at predetermined pressures.

We add that even under the stricter "reasonably pertinent to the particular problem with which the inventor was concerned" analogous art test, *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992), Kenchington is analogous art. Appellants indicate that the problem they seek to solve is maintaining a compressive load to a fuel cell assembly within a predetermined pressure range at ambient and elevated temperatures. Appellants' Specification indicates that the change in pressure in the gas spring follows Boyle's Law and that the membranes are urged apart axially by increasing pressure (i.e., a change in volume).[3] Accordingly, Appellants'

[3] According to Boyle's Law, pressure (P) and volume (V) are inversely proportional (i.e., PV=k). According to Charles' Law, volume (V) and

claimed gas spring encounters both an increase in pressure and volume due to an increase in temperature.

Similarly, Kenchington's valves control pressure within the device in response to changes in pressure caused by volume changes. Boyle's Law indicates that pressure and volume are inversely proportional. Accordingly, Kenchington's valves, which Appellants argue control pressure and volume in the chambers, serve the same purpose as Appellants' claimed valves that control the gas in the gas spring according to Boyle's Law. Therefore, even under the stricter analogous art test indicated in *Oetiker*, Kenchington is reasonably pertinent to the problem Appellants are trying to solve.

Appellants argue lack of motivation for the combination of Kenchington's valves with Simpkins' fuel cell assembly, and that Kenchington teaches away from the proposed combination. However, as noted above, we find that there is motivation for the combination: to prevent overpressurization of the gas spring. Kenchington discloses the motivation in that the valves release or admit gas when a preset pressure limit is reached.

Moreover, we do not agree with Appellants that Kenchington's use of the valves in a cyclically operated fluid displacement machine teaches away from using the valves in Simpkins' gas spring of the fuel cell assembly. Rather, as noted above, we determine Kenchington would have suggested using the valves in Simpkins' gas spring to avoid overpressurization.

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temperature (T) are directly proportional (i.e., V/T=k). Boyle's Law and Charles' Law together yield the Combined Gas Law that mathematically states (PV)/T=k. It follows that a change in temperature will produce a proportional change in volume and pressure.

Appellants argue that the Examiner's combination of valves from different Kenchington embodiments shows lack of motivation. We view the Examiner's rejection pointing to the different valves as showing the concept of providing valves for the ingress and egress of gas is known. In fact, contrary to Appellants' argument, Kenchington's compressor embodiment shows a combination of an inlet valve 106 (i.e., check valve) for the ingress of gas and a valve 116 (i.e., check valve) for the egress of gas. Accordingly, Kenchington clearly demonstrates the combination of a first valve and a second valve within a single embodiment. Appellants' arguments are without persuasive merit.

We add that the combination of Kenchington's valves with Simpkins' gas spring of the fuel cell assembly would have been obvious because it is nothing more than the predictable use of prior elements (i.e., check valves) according to their established functions (i.e., releasing or admitting gas when a particular pressure is reached). *KSR*, 127 S. Ct. at 1740.

For the above reasons, we sustain the Examiner's § 103 rejection of claims 11-29 over Simpkins in view of Kenchington.

DECISION

The Examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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